

## REMARKS

Claims 1-19 are pending in this application.

The Office Action rejects claims 6-17 under 35 U.S.C. § 102(b) as being anticipated by Sullivan et al. (U.S. Patent No. 5,821,680), The Office action also rejects claims 1-5 under 35 U.S.C. § 103(a) as being unpatentable over Cuomo et al. (U.S. Patent No. 5,852,303) in view of Geis et al. (U.S. Patent No. 5,463,271) and claims 18-19 under 35 U.S.C. § 103(a) as being unpatentable over Sullivan et al. in view of Cuomo et al. These rejections are traversed.

Present claims 1-5 require "[a]n electronic element, comprising a deposited film containing cesium, said deposited film comprising a plurality of projections composed of cesium oxide on a surface thereof."

Claims 6-17 require "[a]n electronic element, comprising a main body that is formed of an amorphous film of carbon and that contains a metal element having a metal bound radius equal to or larger than two times the atom radius of carbon, and a surface layer that covers said main body and that is formed of an amorphous film of carbon having a high  $sp^3$  hybridization."

The Office Action asserts that the Sullivan et al. Abstract "discloses an electronic element that has at least two layers of amorphous carbon film [and this] would include a main body and a surface layer" (see section 2 on page 2 of the Office Action).

The Office Action asserts that the film can include cesium.

However, Applicants respectfully note that Sullivan et al. nowhere teach (or suggest) that their film layers 110 and 115 can include cesium. Furthermore, Sullivan et al. actually teach against the inclusion of cesium. In particular, Sullivan et al. disclose

that known are "surface absorbed or deposited layers, such as cesium... deposited on a material such as diamond or carbon to improve electron emission properties... However, these prior art materials are expensive to produce over the large areas necessary for field emission application (patterned bulk material) or display undesirable properties such as high turn – on voltage, or non-uniform spatial or temporal emission characteristics..." (see Sullivan et al. column 1, lines 53-67).

Thus, it is respectfully submitted that Sullivan et al. is missing (and actually teaches against) claimed elements of present claims 6-19, including, for example, "a main body, ... that contains a metal element having a metal body radius equal to or larger than two times the atom radius of carbon."

As the Office Action appears to correctly note, Cuomo et al. do not teach or suggest "a plurality of projections comprised of cesium oxide on a surface," as required by present claims 1-5.

However, the Office Action asserts that Geis et al. teaches the use of emitter tips in Figure 3.

Applicants respectfully note that in the presently claimed invention "cesium present on the surface of the film combines with oxygen in the air to form stable cesium oxide, since cesium is active. The cesium oxide is extremely fine, but forms projections. In a cold cathode element including such an electronic element, the electric field from the element is reduced and hence even if the voltage applied to the cold cathode element is lowered, a sufficient emission of electrons can be realized." (see page 2, lines 13-19).

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Geis et al. do not teach or suggest, and actually teach against, a cesium containing film comprising a plurality of projections comprised of cesium oxide on a surface thereof, as is required by the present invention. Additionally, Geis et al. teach against the reduction of the electric field that occurs with the presently claimed invention. In particular, Geis et al. disclose that "the growth of metal layer 24 is terminated when layer 24 reaches a monolayer of metal atoms... The work function along layer 24 is then close to the minimum value so that the electron emissivity is the greatest" (see Geis et al. column 5, lines 63-67).

Thus, the combination of Cuomo et al. with Geis et al. fails to include each element of present claims 1-5, including for example cesium containing "film comprising a plurality of projections comprised of cesium oxide on a surface thereof." Additionally, the combination of Cuomo et al. and Geis et al. fails to teach or suggest (and does teach against) such a combination achieving a reduced electric field.

Thus, for at least the above reasons, Applicants respectfully submit that present claims 1-5 would not have been obvious over the applied combination of references.

Additionally, regarding present claim 2, the Office Action assert that "tips with a height between 10 and 500 nanometers is not shown to solve any problems..."

However, Applicants respectively point out that at page 6, lines 8-13, of the present specification, it is clearly stated that "if the average height  $h$  of the conical projections 4 is smaller than 10nm, no effect is provided. On the other hand, if the average height  $h$  of the conical projections 4 is larger than 500 nm, the distortion in the surface of the element and in the vicinity thereof is increased, and as a result, cracks are liable to be produced in the cold cathode element."

Thus, as the 10 to 500 nanometer height clearly solves the above-described problems, claim 2 would not have been obvious over the applied references for this additional reason.

Thus, for at least the above reasons, reconsideration and withdrawal of the rejections under 35 U.S.C. § 102 and § 103(a) are respectfully requested.

### **Conclusion**

Applicants respectfully submit that this application is in condition for allowance and such action is earnestly solicited. If the Examiner believes that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below to schedule a personal or telephone interview to discuss any remaining issues.

In the event this paper is not considered to be timely filed, Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing attorney docket number 107348-09095.**

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Robert K. Carpenter", is written over a horizontal line.

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